Claims

1. Apparatus for mixing of a chemical medium in gaseous or liquid state with a pulp suspension, comprising a housing having a wall (2) that defines a mixing chamber (4), a first feeder (6) for feeding the pulp suspension to the mixing chamber, a rotor shaft (8, 204, 300, 406, 502), that extends in the mixing chamber, a drive device for rotation of the rotor shaft, a rotor body (10, 200, 407, 504), that is connected to the rotor shaft and arranged to supply kinetic energy to the pulp suspension flow, during rotation of the rotor shaft by the rotation of the drive device, such that turbulence is produced in a turbulent flow zone (12) in the mixing chamber, a second feeder (13) for feeding of the chemical medium to the mixing chamber, and an outlet for discharging the mixture of chemical medium and pulp suspension from the mixing chamber, **characterised in** that the second feeder (13) comprises a chemical distribution element (14) integrated with the rotor body (10, 200, 504) and arranged to distribute the chemical medium to or to close vicinity to said turbulent flow zone (12).

2. Apparatus according to claim 1, **characterised in** that the rotor body (10, 200, 407, 504) comprise a number of rotor pins (106, 202, 408, 506, 506´), which extends from the rotor shaft (8, 102, 204, 300, 406, 502).

3. Apparatus according to claim 2, **characterised in** that chemical distribution element comprises at least one chemical outlet (16, 104) situated up-stream of the rotor pins (106, 202, 408, 506, 506´).

4. Apparatus according to claim 3, **characterised in** that chemical distribution element (14) comprise at least one distribution pipe (100) that extends radial from the rotor shaft (8, 102, 204, 300, 406, 502), whereby the chemical outlet (104) is arranged on the distribution pipe.

5. Apparatus according to claim 4, **characterised in** that the chemical outlet (104) is directed against the rotor pins (106, 202, 408, 506, 506´).

6. Apparatus according to claim 2, **characterised in** that the chemical distribution element (14) comprise at least one chemical outlet (104) arranged on at least one of the rotor pins (106, 202, 408, 506, 506´).

7. Apparatus according to claim 6, **characterised in** that the chemical outlet (104) is directed in the opposite flow direction (F) of the pulp suspension along the rotor shaft (8, 102, 204, 300, 406, 502).

8. Apparatus according to claim 6, **characterised in** that the chemical outlet (16, 104'') is directed radial from the rotor shaft (8, 102, 204, 300, 406, 502).

9. Apparatus according to claim 6, **characterised in** that the chemical outlet (104, 104') is directed transverse the flow direction (F) of the pulp suspension.

10. Apparatus according to claim 2, **characterised in** that the chemical distribution element (14) comprise a plurality of chemical outlets (104) arranged on at least one of the rotor pins (106, 202, 408, 506, 506´), whereby at least one chemical outlet (104, 104') is directed in the opposite flow direction (F) of the pulp suspension

along the rotor shaft and at least one chemical outlet (104'') is directed radial out from the rotor shaft (8, 102, 204, 300, 406, 502).

11. Apparatus according to any of claims 3-10, **characterised in** that the second feeder comprise a stationary cylindrical body (18), which is coaxial with the rotor shaft (8, 102, 204, 300, 406, 502), and that the rotor body (10, 200, 407, 504) comprises a sleeve (20) that sealingly surrounds the cylindrical body, whereby the cylindrical body is provided with a channel for the chemical medium that communicates with the chemical distribution element (14).

12. Apparatus according to claim 11, **characterised in** that the second feeder (13) comprise a connection pipe (22), that extends through the wall (2) of the housing to the stationary cylindrical body (18) and that is connected to the channel therein.

13. Apparatus according to any of claims 2-12, **characterised in** that each rotor pin (106, 202, 408, 506, 506´) is curved forward from the rotor shaft (8, 102, 204, 300, 406, 502) or backward relatively to the rotational direction of the rotor body (10, 200, 407, 504).

14. Apparatus according to any of claims 2-13, **characterised in** that each rotor pin (106, 202, 408, 506, 506´) has a width (b), as seen in the rotational direction of the rotor body (10, 200, 407, 504), that increase along at least a part of the rotor body in direction against the rotor shaft (8, 102, 204, 300, 406, 502).

15. Apparatus according to any of claims 2-14, **characterised in** that each rotor pin (106, 202, 408, 506, 506´) has a circular, quadratic or shovel-shaped cross-section.

16. Apparatus according to any of claims 2-14, **characterised in** that each rotor pin (106, 202, 408, 506, 506´) has a helix shape.

17. Apparatus according to claim 16, **characterised in** that each rotor pin (106, 202, 408, 506, 506´) has a quadratic cross-section.

18. Apparatus according to any of claims 1-17, **characterised in** that the rotor shaft (8, 102, 204, 300, 406, 502) is provided with an axially flow generating element (302).

19. Apparatus according to claim 18, **characterised in** that the axial flow-generating element (302) comprise a number of blades (304), which are obliquely attached relatively to the rotor shaft (8, 102, 204, 300, 406, 502).

20. Apparatus according to claim 18, **characterised in** that the axial flow-generating element (302) comprise a screw thread or a band thread (306), which extends along the rotor shaft (8, 204, 300, 406, 502).

21. Apparatus according to any of claims 1-20, **characterised in** that a flow-restraining disk (400, 500) with one or more flow passages (402, 510) is arranged to temporarily increase the flow velocity of the pulp suspension when the pulp suspension passes the flow-restraining disk.

22. Apparatus according to claim 21, **characterised in** that each flow passage (402, 510) extend obliquely from the up-stream side of the disk against the centre shaft (C) of the disk.

23. Apparatus according to claim 21 or 22, **characterised in** that the flow area (A) of each flow passage (402, 510) increases or decreases in the direction of the flow.

24. Apparatus according to any of claims 21-23, **characterised in** that the disk is provided with a plurality of flow passages (402, 510) that form a Cartesian or polar pattern.

25. Apparatus according to any of claims 21-24, **characterised in** that the disk (400, 500) is circular or coaxial to the rotor shaft (8, 102, 204, 300, 406, 502).

26. Apparatus according to any of claims 21-25, **characterised in** that the disk (400, 500) is stationary arranged in the housing.

27. Apparatus according to claim 26, **characterised in** that the flow-restraining disk (400) comprise channels (412) for distribution of the chemical medium on the down-stream side of the rotor body.

28. Apparatus according to claim 26 or 27, **characterised in** that the disk (400, 500) comprise a number of concentrically rings (404, 508), which are coaxial with the rotor shaft (8, 102, 204, 300, 406, 502), and at least one radial bar (410), that fixates the rings relatively each other and that are attached in the wall of the

housing, whereby the flow passages (402, 510) are defined by the rings and the bar.

29. Apparatus according to any of claims 21-25, **characterised in** that the disk (400, 500) is integrated with the rotor shaft (8, 102, 204, 300, 406, 502).

30. Apparatus according to claim 29, **characterised in** that the rotor body (10, 200, 407, 504) comprise a number of pins (106, 202, 408, 506, 506´), that extends from the rotor shaft (8, 102, 204, 300, 406, 502), whereby the disk (400, 500) is fixed to the pins on the down-stream side of the rotor body.

31. Apparatus according to claim 30, **characterised in** that the rotor body (10, 200, 407, 504) comprise an additional number of pins (202, 408, 506, 506´), that extends from the rotor shaft (8, 102, 204, 300, 406, 502) on the down-stream side of the disk, whereby the disk (400, 500) is also fixed to said additional pins (106, 202, 408, 506, 506´).

32. Apparatus according to claim 30 or 31, **characterised in** that the disk (400, 500) comprise a number of concentrically rings (404, 508), which are coaxial with the rotor shaft (8, 102, 204, 300, 406, 502), and the rotor pins (106, 202, 408, 506, 506´) fixates the rings in relation to each other, whereby flow passages (402, 510) are defined by the pins and the rings.

33 Apparatus according to any of claims 29-32, **characterised in** that spacer elements (511) are arranged between the disk (400, 500) and the rotor pins (106, 202, 408, 506, 506´).